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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/538,524

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Kenji Kiyama

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EXAMINER

ST CLAIR, ANDREW D

ART UNIT

PAPER NUMBER

3743

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/538,524	<b>Applicant(s)</b> KIYAMA ET AL.	
	<b>Examiner</b> ANDREW ST CLAIR	<b>Art Unit</b> 3743	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 07 July 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 2,4-16 and 26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2,4-16 and 26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Arguments***

1. In re claims 2, 4-16, and 26, Applicants' arguments are fully considered and responded to below.

As to the prior art rejections, Applicants argue that the air flow of Garcia-Mallol cannot inhibit NO<sub>x</sub>. (Remarks, 8). This assertion seems to be factually incorrect; Garcia-Mallol discloses controlling a primary and secondary air explicitly for the purpose of reducing NO<sub>x</sub>. (Abstract; "As a result, the formation of nitrous oxides are reduced..."). Moreover, as made clear by the Non-Final Office Action, the structure of the port of Garcia-Mallol is combined with the apparatus and function of Morita et al. (Page 4; "Morita et al. further disclose the claimed subject matter wherein said nitrogen oxide generation inhibiting gas is constituted by at least one gas selected from a group comprising a combustion exhaust gas, a mixed gas of the combustion exhaust gas and the air, and the air. (col. 8, ln. 38-39.)") As such, the air composition of Garcia-Mallol is irrelevant.

Applicants further asserts that claim 12 depends from claim 2 and is thus patentable for at least the same reasons. Because claim 12 depends from claim 2, the above response applies to it as well.

The balance of Applicants' arguments are addressed by the new grounds of rejection, necessitated by amendment.

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***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 2, 4-16, and 26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

All of the claims depend either directly or indirectly from claim 2, which has no transitional phrase. It is thus unclear what the scope of the claims are with respect to what unrecited additional components, if any, are excluded from the scope of the claims. See MPEP § 2111.03.

The first words of the amended claim 2 read "A combustion apparatus a burner burning a fuel..." It is unclear whether "A combustion apparatus" is distinct from "a burner," and if they are distinct it is unclear what structural cooperation there is between the components. See MPEP § 2172.01.

Claim 2 further recites a Markush group using an improper format including the phrase "comprising." See MPEP 2173.05(h).

Claim 14 reads in part "...and a flow rate regulator for providing an increased flow of the nitrogen oxide generator inhibiting gas to an air port close to the furnace center portion than the air port close to the furnace side wall of the plurality of ports." This limitation is indiscernible, rendering the scope of the claimed subject matter unclear.

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***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 2, 4-11, 13-16 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morita et al. (US 4,545,307) in view of Garcia-Mallol (US 5,272,480).

With respect to claim 2, Morita et al. discloses a burner (see fig. 1) burning a fuel within a furnace in a theoretical air ratio or less (col. 1, ln. 45-50); an air port 57 arranged downstream of the burner and injecting additional combustion air into the furnace; and an inhibiting gas supply means 12 for supplying a nitrogen oxide generation inhibiting gas inhibiting a nitrogen oxide from being generated provided in a mixing region formed by both of a combustion gas generated by burning the fuel by means of said burner and a combustion air injected from said air port or near the mixing region, wherein said nitrogen oxide generation inhibiting gas is constituted by at least one gas selected from a group comprising a combustion exhaust gas, a mixed gas of the combustion exhaust gas the air, and low temperature air (col. 8, ln. 38-39). Morita et al. is ambiguous as to the details of air port 57. Garcia-Mallol discloses a similar invention including an over-fire air port control system. Garcia-Mallol further discloses motivation to combine. (col 2, ln. 10-17) It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the furnace and air port of Morita et al. with the over-fire air port control system of Garcia-Mallol for the purpose of precisely controlling fuel-air ratios and minimizing nitrous oxides. The control system of Garcia Mallol has an inner

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side of the air port separated into a flow path 28 injecting said combustion air, and a flow path 30 injecting said nitrogen oxide generation inhibiting gas 30. (The secondary air flowing from path 28 is considered to be “combustion air” in that it is combusted, the secondary air flowing from path 30 is considered to be “nitrogen oxide generation inhibiting gas” in that the staged combustion using this air inhibits nitrogen oxide generation.)

With respect to claim 26, Morita et al. further discloses the claimed subject matter wherein said nitrogen oxide generation inhibiting gas is constituted by at least one gas selected from the group consisting of a combustion exhaust gas, a mixed gas of the combustion exhaust gas and air, and air having a temperature lower than that of the additional combustion air. (col. 8, ln. 38-39).

With respect to claim 13, Morita et al. further discloses the claimed subject matter wherein a plurality of air ports 57 are placed along a width direction of said furnace (see fig. 1). The air ports of Garcia-Mallol is provided with inhibiting gas supply means 30 and a flow rate regulating means 20b for regulating a flow rate of the nitrogen oxide generation inhibiting gas.

With respect to claim 14, Morita et al. further discloses the claimed subject matter wherein a plurality of air ports 57 are placed along a width direction of said furnace (see fig. 1), each of the air ports is provided with said inhibiting gas supply means 30, and a flow rate regulator 22a and 22b. The recitation of “for providing an increased flow of...” is considered intended use. A recitation of the intended use of the claimed invention must result in a definite structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use it is considered to disclose the claim limitation. Garcia-Mallol is

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considered to disclose this claim limitation in that the flow rates are adjustable via dampers 22a and 22b, and thus a plurality of the air ports would be capable of having any combination of relative flow rates.

With respect to claim 15, Garcia-Mallol further discloses the control system wherein a total supply flow rate of the nitrogen oxide generation inhibiting gas supplied to said plurality of air ports is variable in correspondence to a load of said combustion apparatus. (fig. 1; col. 3, ln. 66-col. 4, ln. 2.)

With respect to claim 16, Garcia-Mallol further discloses the claimed subject matter wherein a total supply flow rate of the nitrogen oxide generation inhibiting gas supplied to said plurality of air ports is variable in correspondence to a nitrogen oxide discharging concentration of said combustion apparatus. (fig. 1; col. 3, ln. 66- col. 4, ln. 2; col. 3, 30-45; Garcia-Mallol is considered to disclose the claim limitation in that it discloses a variable flow rate based on the stoichiometric ratio of the burner, which is interrelated with the concentration of nitrogen oxide.)

With respect to claim 4, Garcia-Mallol further discloses the claimed subject matter wherein said nitrogen oxide generation inhibiting gas is injected into the furnace from an inhibiting gas injection port provided on an outer peripheral portion side of an air injection port of said air port. (fig. 1, flow path 30 is on the outer periphery of the air port.)

With respect to claim 5, Garcia-Mallol further discloses the claimed subject matter wherein said inhibiting gas injection port is formed in an annular shape so as to surround the air injection port of said air port. (col. 3, 14-16; flow path 30 is describes as being annular, thus surrounding flow path 28.)

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With respect specifically to claim 6, Garcia-Mallol discloses said inhibiting gas injecting port arranged in a peripheral direction so as to surround the air injection port of said air port. (col. 3, 14-16; flow path 30 is describes as being annular, thus surrounding flow path 28.) With respect to the recitation of “*a plurality* of said inhibiting gas injecting ports,” it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide duplicative concentric ports of the type disclosed by Garcia-Mallol because duplication of parts is considered to be *prima facie* obvious. MPEP 2144.04; *In re Harza*, 274 F.2d 669 (CCPA 1960).

With respect specifically to claim 7, Garcia-Mallol discloses said inhibiting gas injection port being formed approximately in a circular arc shape so as to surround a part of the air injection port of said air port. (col. 3, 14-16; flow path 30 is describes as being annular, thus surrounding flow path 28.)

With respect specifically to claim 8, Garcia-Mallol discloses said inhibiting gas injection port is concentrically arranged in a part of an outer peripheral portion of the air injection port of said air port. (fig. 1, flow path 30 is on the outer periphery of the air port; col. 3, 14-16, flow path 30 is describes as being annular.) With respect to the recitation of “*a plurality* of said inhibiting gas injection ports,” it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide duplicative concentric ports of the type disclosed by Garcia-Mallol because duplication of parts is considered to be *prima facie* obvious. MPEP 2144.04; *In re Harza*, 274 F.2d 669 (CCPA 1960).



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With respect specifically to claim 9, Garcia-Mallol discloses said inhibiting gas injection port is arranged in the burner side of the air injection port of said air port. (fig. 1; flow path 30 is partially on the bottom side of flow path 28, which corresponds to the side closest to the burner.)

With respect to claim 10, Garcia-Mallol further discloses the claimed subject matter wherein further comprising a system for supplying a part of exhaust gas recirculation within said furnace as the nitrogen oxide generation inhibiting gas in a branched state. (see fig. 1, the flow paths are considered to be “branched.”)

With respect to claim 11, Garcia-Mallol further discloses the claimed subject matter wherein a blower exclusive for the nitrogen oxide generation inhibiting gas is placed in said inhibiting gas supply system for supplying a part of exhaust gas recirculation. (col. 1, ln. 37; “separate blowers...”)

6. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Morita et al. (US 4,545,307) in view of Garcia-Mallol (US 5,727,480) in further view of Kobayashi et al. (US 5,231,937).

With respect to claim 12, Morita et al. discloses the use of a mixture of air and exhaust gas, or exhaust gas alone. (col. 8, ln. 38-39.) Morita et al. does not disclose said nitrogen oxide generation inhibiting gas being constituted by an exhaust gas after a temperature thereof is lowered by a heat exchanger. It is old and well-known in the art to lower the temperature of an exhaust gas by means of a heat exchanger, as evidenced by Kobayashi et al. (fig. 1.) It would have been obvious to provide the heat exchanger of Kobayashi et al. with the furnace system of Morita et al. because all of the claimed elements were known in the prior art and one skilled in

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the art could have combined prior art elements according to known methods with no change in their respective functions, and the combination would have yielded predictable results.

### ***Conclusion***

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANDREW ST CLAIR whose telephone number is (571)270-3513. The examiner can normally be reached on Monday - Friday, 8 a.m. - 6 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Rinehart can be reached on 571-272-4881. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Andrew St.Clair/  
Examiner, Art Unit 3743

/Kenneth B Rinehart/  
Supervisory Patent Examiner, Art Unit 3743